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Quality of Life after Spinal Cord Injury

Jakość życia osób po urazie rdzenia kręgowego

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Abstract

Introduction. Each year approximately 250–500 people experience spinal cord injury, most often as a result of a fall from a height or a road accident. The injured are mostly young men. The quality of life is an increasingly popular topic, which in terms of medicine is conditioned by the state of health. Research on the quality of life of people with spinal cord injury provides valuable information on the needs of people with disabilities.
Aim. The aim of the study was to determine the quality of life of people after spinal cord injury.
Material and Methods. The study was conducted among 30 adults after spinal cord injury from various areas of Poland. The examined group of disabled persons consisted of women and men of various ages and with each level of spinal cord injury. A survey was also conducted among 53 people who were physically fit, matched in terms of gender, age and education. The research tool applied for both groups was the WHOQOL-BREF questionnaire (The World Health Organization, a shortened version of the quality of life survey), distinguishing four areas of the quality of life: somatic, psychological, social and environmental. The analysis of the results was based on: arithmetic mean, standard deviation, distribution normality study with the Shapiro–Wilk test. In order to compare particular variables, Pearson's linear correlation coefficient was calculated. The Mann–Whitney U test was used to assess the significance of differences between the independent groups.
Results. The arithmetic mean of the quality of life result in patients after spinal cord injury was 3.83±0.79, and in the control group 4.00±0.65. The average health assessment in both groups was also slightly different: in patients with spinal cord injury it was 3.4±1.1, and in those with mobility problems respectively 3.7±0.9. The average score obtained by people with spinal cord injury in the somatic field was lower than in those who were physically fit. Also, respondents with spinal cord injuries are less satisfied with the means of transport, health care centres or living conditions, compared to those in the control group.
Conclusions. Summing up the results of the study, it can be said that people with spinal cord injury have a slightly lower overall subjective quality of life than those who are physically fit. Worse quality of life of people after spinal cord injury occurs particularly in the somatic and environmental fields. **(JNNN 2018;7(2):64–69)**
Key Words: spinal cord injury, quality of life, disability

Streszczenie

Wstęp. Każdego roku na świecie urazu rdzenia kręgowego doświadcza 250–500 tys. osób, najczęściej w wyniku upadku z wysokości lub wypadku drogowego. Poszkodowanymi są przeważnie młodzi mężczyźni. Jakość życia to coraz bardziej popularny temat, który w aspekcie medycznym uwarunkowany jest stanem zdrowia. Badania jakości życia osób po urazie rdzenia kręgowego dostarczają cennych informacji na temat potrzeb osób niepełnosprawnych.
Cel. Celem badań było określenie jakości życia osób po urazie rdzenia kręgowego.
Materiał i metody. Badania przeprowadzono wśród 30 osób pełnoletnich po urazie rdzenia kręgowego z różnych obszarów Polski. Badana grupa osób niepełnosprawnych składała się z kobiet i mężczyzn w różnym wieku i z każdym poziomem uszkodzenia rdzenia kręgowego. Przeprowadzono również sondaż wśród grupy kontrolnej, 53 osób sprawnych ruchowo, dobranych pod względem płci, wieku i wykształcenia. Narzędzie badawcze dla obu grup stanowił kwestionariusz WHOQOL-BREF (ang. The World Health Organization Quality of Life, skrócona wersja

ankiety oceniającej jakość życia), rozróżniająca cztery dziedziny jakości życia: somatyczną, psychologiczną, socjalną i środowiskową. Do analizy wyników stosowano: średnią arytmetyczną, odchylenie standardowe, badanie normalności rozkładu testem Shapiro–Wilka. W celu porównania poszczególnych zmiennych liczono współczynnik korelacji liniowej Pearsona. Do oceny istotności różnic między grupami niezależnymi stosowano test U Manna–Whitneya.
Wyniki. Średnia arytmetyczna wyniku z jakości życia u osób po urazie rdzenia kręgowego wynosiła 3,83±0,79, a w grupie osób z grupy kontrolnej 4,00±0,65. Średnia ocena stanu zdrowia w obu grupach również różniła się nieznacznie: u osób po urazie rdzenia kręgowego wynosiła 3,4±1,1, a u osób sprawnych ruchowo 3,7±0,9. Średni wynik uzyskany przez osoby po urazie rdzenia kręgowego w dziedzinie somatycznej był niższy niż u osób sprawnych ruchowo. Także osoby z uszkodzonym rdzenia kręgowego są mniej zadowolone ze środków transportu, placówek ochrony zdrowia czy warunków bytowych, w porównaniu z osobami z grupy kontrolnej.
Wnioski. Podsumowując wyniki badań można powiedzieć, że osoby po urazie rdzenia kręgowego mają nieznacznie niższą ogólną subiektywną jakość życia niż osoby sprawne ruchowo. Gorsza jakość życie osób po urazie rdzenia kręgowego występuje szczególnie w dziedzinie somatycznej i środowiskowej. **(PNN 2018;7(2):64–69)**
Słowa kluczowe: uraz rdzenia kręgowego, jakość życia, niepełnosprawność

Introduction

According to the World Health Organization (WHO), 250–500 thousand people in the world experience spinal cord injury every year. The vast majority, as much as 90% of core damage is caused by injuries resulting from of road accidents, falls or violence. The group of higher risk consists of men aged 20–29 years. The ratio of men to women is at least 2:1. Approximately 60% of spinal cord injuries affect people between 16 and 30 years of age. A large group is also made up of older people — women over 60 and men over 70 — due to falls [1–3]. In Poland, the number of new cases of spinal cord injury ranges 6–35 per million inhabitants. A similar frequency occurs in highly developed countries [4].

Injuries usually concern the cervical segment and the thoraco-lumbar border area. The mechanism of spinal cord injury is complex. The most common cause being a spine fracture. Rarely, the spinal cord is completely interrupted, usually the continuity of the core is preserved, and there is a complete or partial disorder of its function [3].

Damaged elements of the vertebrae move to the spinal canal and cause primary injury. Changes in the spinal cord trigger a number of pathological processes, sometimes more harmful than the injury itself [1,5]. In the early period after the injury, central necrosis occurs in the gray core. In the next hours following the injury, electrolyte and metabolic processes develop. Their consequence is platelet aggregation and the formation of micro-thrombi. These processes result in the formation of secondary outbreaks of small haemorrhages. As a result, the so-called secondary spinal cord injury develops [1,6]. The described phenomena characterize the first, acute period of spinal cord injury. After approximately three weeks, there is a next stage — the regeneration-compensation one. During this period, symptoms of spinal shock disappear, new inter-neuronal connections are formed. Pathological symptoms, such as cord spasticity, begin to occur. If the damage was incomplete, there is a possibility of compensation of the lost functions. From the period ranging from 6 to 24 months following the injury, the time of perpetuating neuropathological disorders is distinguished. There is bending or straightening spasticity, as well sensory disturbances. Peri-articular ossifications and fractures of long bones appear. Very often, the patient suffers from an infection or urolithiasis. Two years after the injury there begins the stage of perpetuated neurological damage. Sometimes extensive surgery is needed. Changes in the joints intensify, trophic changes are visible on the skin. The chronic condition lasts a lifetime. There occur various pathological changes — repeated infections, perpetuated changes in the urinary tract, venous insufficiency, decubitus ulcers. The patient feels pain of various origin [1,5].

Depending on the level of spinal cord injury, specific features are observed. Damage to C3 and C4 vertebrae above all results in difficulty in breathing. Injury at the height of C5 — Th1 can give symptoms associated with the compression of the vertebral artery. These include visual disturbances, cerebellar symptoms and brain stem damage. Changes occur within the autonomic nervous system. There is a decline in blood pressure, increased pulmonary leakage, retention of mucus in the airways, periods of hyperthermia. The Th12 — L1 segment of the spine contains a spinal cone with bladder and anal sphincter regulators. Disorders are of core-root nature. Damage within the L2-L5 section is characterized by the possibility of regeneration, because in the vertebral canal at this height the spinal cord changes into a horse's tail. An injury at the height of the sacral bone is rare and is characterized by sphincter dysfunctions [1,5,6].

What happens in the person's psyche after spinal cord injury, in psychology it can be called a crisis. A crisis means a situation in which resources, adaptation abilities of a person are insufficient against the burden of an event [1].

At first, the patient experiences a shock. Subconsciously they use then the mechanism of denial, that is, they do not believe in the diagnosis, do not allow themselves to

think about disability, then there is a period of rebellion, aggression. Expressing anger brings relief. Another process — to bid — is to think "what would happen if…". The patient is considering various hypotheses. They wonder if there would have been an accident if they had behaved otherwise. The next stage is experiencing depressive thoughts. They consciously experience pain and loss. After all these stages, it is possible for a person to accept the situation and live with it [1,5].

During this difficult time, it is very important to have support from relatives, even if the patient rejects any form of help. It is important to learn new rules for the functioning of one's own physiology — changes including among others: urogenital, digestive systems. It is necessary to explain to the patient the mechanism of spasticity, sensory disorders, and to teach how to prevent complications. Gradually, as a part of rehabilitation, the patient acquires the ability to move in a wheelchair, perform activities of everyday life. They learn the technique of emptying the bladder and intestines. In the acute period, when the patient is in shock, education is not possible. Often, this condition lasts until discharge home [1,5,7].

The aim of this study was to get to know the quality of life of people after spinal cord injury.

Material and Methods

The research was conducted among people with spinal cord injury (the first group), and among those who were physically fit and selected in terms of gender, age and education (control group).

The first study group consisted of 30 people, including 17 men (56.67%) and 13 women (43.33%). The majority (63.33%) had secondary education, 26.7% had vocational education, 6.7% had primary education, and only one respondent (3.3%) had a master degree. Among the respondents, 46.7% were lonely, 30% were married and 23.3% were in an informal relationship. Among the respondents, 10% lived alone, others lived with their family, partners or caregivers. Every third respondent (33.3%) suffered from spinal cord injury in the cervical segment, 26.7% at the level of the thoracic segment, 23.3% of the lumbar section, and 16.7% of the spinal cord's sacral section. The total paralysis was experienced by 30% of respondents, partial motor paralysis with sensory function by 30%, partial motor paralysis with lack of sensation by 23.3%, and 16.7% of respondents function with total motor paralysis and preserved sensation. The largest number of respondents (36.7%) have been functioning for more than 10 years since the accident, in 33.2% the post-accident period was in the range over 2 to 10 years, and 30% experienced an injury during the last 2 years. The control group was selected in terms of sex, age and education to a group of people after spinal cord injury. It consisted of 53 respondents, including 30 men (56.60%) and 23 women (43.40%). More than half of the respondents (56.6%) are people between 26 and 45 years of age, 26.4% between 18 and 25, and 10% between 46 and 65. The highest number of respondents (62.3%) had secondary education. The master's degree was declared by 3.8% of the respondents, 26.4% of the respondents completed the vocational school, and 7.5% of the respondents declared completing the primary one (Table 1).

Table 1. Characteristics of the studied population

Variable	Studied group N (%)	Control group N (%)
Gender		
Woman	13 (43.4)	23 (43.4)
Man	17 (56.67)	30 (56.6)
Age (years)		
18–25	8 (26.66)	14 (26.4)
26–45	17 (56.67)	30 (56.6)
46–65	5 (16.66)	9 (17)
Level of education		
Primary	2 (6.7)	4 (7.5)
Secondary	19 (63.3)	33 (62.3)
Vocational	8 (26.7)	14 (26.4)
Higher	1 (3.3)	2 (3.8)
Marital status		
Marriage	9 (30)	–
Single people	7 (23.3)	–
Lonely people	14 (46.7)	–
Area where the spinal cord injury occurred		
Cervical section	10 (33.3)	–
Thoracic segment	8 (26.7)	–
Lumbar section	7 (23.3)	–
Sacral section	5 (16.7)	–

Authors' own questionnaire and the WHOQOL-BREF questionnaire in the Polish version [8] were the research tools applied. To analyze the results, basic techniques of descriptive statistics were used: arithmetic mean, standard deviation, normality study of distribution by the Shapiro–Wilk test. In order to compare individual variables, the Pearson's linear correlation coefficient was applied. The Mann–Whitney U test was used to assess the significance of differences between the independent groups. Statistical analyses were performed in the following programs: Microsoft Excel 2016 and Statistica 12.

Results

The arithmetic mean of the quality of life outcome in patients with spinal cord injury was 3.83±0.79, and in the control group 4.00±0.65. Therefore, the subjective, overall quality of life of people with spinal cord injury was slightly lower than that of healthy people. The average health assessment in both groups was also slightly different: in patients with spinal cord injury, it was 3.4±1.1, and in the control group 3.7±0.9.

The mean score obtained by people with spinal cord injury in the somatic field was lower than in the control group (22.9±5.2 vs 26.9±4) (Table 2). People with disabilities were characterized by the difficulty in performing everyday activities, feeling tired, disturbed rest and sleep, as well as by dependence on drugs and pain. In the psychological, social and environmental fields, both research groups obtained similar results. Analyzing aspects from the environmental field it could be noted that people with injured spinal cord are less satisfied with means of transport, health care centres or living conditions, compared to those physically fit.

Among people with spinal cord injury, an analysis of the impact of gender on the quality of life was carried out. The respondents defined their quality of life on a scale from 1 — very bad to 5 — very good. The mean arithmetic responses for both sexes were similar — among women the average was 3.7±1.8, and among men 3.9±2.9. Normality of the distribution of values measured by the Shapiro–Wilk test ($p<0.05$) (Table 3).

Table 2. Functioning in individual fields

Field	Somatic Max=35 points	Psychological Max=30 points	Social Max=15 points	Environmental Max=40 points
Persons after spinal cord injury n=30	22.9	23.2	11.2	27.3
p	0.34	0.08	0.16	0.16
SD	5.2	4.0	2.0	5.2
Control group n=53	26.9	22.8	10.9	28.7
p	0.01	0.44	0.16	0.5
SD	4.0	3.4	2.2	3.8

Table 3. Gender and the quality of life

Gender and the quality of life	Women	Men
Arithmetic mean	3.7±1.8	3.9±2.9

Women more often than men responded by marking lower values (on average 1 — 3.0 points) of the quality of life. Just over half of the women chose a good quality of life (3–4 pts). The vast majority of men chose the answer 3–4, meaning good quality of life. There were fewer answers than in the case of women, at the level of 1–3 points. The overall quality of men's life is higher than women's.

In the quality of life profile by areas, there are also differences. Women in every area — somatic, psychological, social and environmental — show a lower quality of life than men. The largest difference is visible in the psychological field — the average value for women was 21.3±4.4, and for men 24.6±3.2. The normality of the distribution of values measured by the Shapiro–Wilk test ($p<0.05$). Women responded more critically to questions about feeling emotions, attitudes to their own physical appearance, self-esteem, memory and thinking, as well as spirituality (Table 4).

Table 4. Comparison of the results of functioning in individual fields among women and men after spinal cord injury

Area	Women N=13	Men N=17
Somatic Max=35points	22.1	23.6
SD	5.7	4.9
p	0.9	0.4
Psychological Max=30 points	21.3	24.6
SD	4.4	3.2
p	0.6	0.1
Social Max=15 points	10.8	11.6
SD	2.2	1.9
p	0.5	0.1
Environment Max=40 points	25.8	28.5
SD	5.6	4.65
p	0.4	0.7

The general quality of life of people with a given level of spinal cord injury was studied. The worst overall quality of life was characteristic of people after thoracic spinal cord injury — an arithmetic mean of 3.25±0.89. In other injuries, the arithmetic mean was 4.0 (for the lumbar section) and 4.1 for the cervical section.

An analysis of the correlation between self-assessment of health and general quality of life was also carried out. The Pearson's linear correlation coefficient was applied. The relationship between the somatic domain and the quality of life was obtained of an average strength (r=0.49). The correlation of the psychological dominant (r=0.80) and environmental (r=0.76) with the overall quality of life turned out to be the strongest. In contrast, the strength of the relationship between the social field and the general quality of life was r=0.57 (Table 5).

Table 5. Correlations affecting the overall quality of life

Self-assessment of health condition	Psychological area	Environmental area	Social area
r=0.49	r=0.80	r=0.76	r=0.57

Discussion

The quality of life is a complex and multidimensional concept. In many of the aforementioned results, high standard deviations as well as distributions of values different from normal distribution were obtained. Large dispersion of results indicates the diversity of the research group and constitutes a problem in formulating general conclusions. This work is an attempt to answer the question about the quality of life of people with traumatic spinal cord injury. The study results show that the subjective overall quality of life of people after spinal cord injury is lower than in the case of healthy people [4].

The quality of life in a subjective sense means the degree of satisfaction with the fulfilled needs and objectives accomplished. The high quality of life in this approach is equal to the perception of reality as close as possible to that desired by the individual. Studies show a lower value of this quality of life in people with disabilities, the authors emphasize however that the difference between healthy group and respondents after spinal cord injury is not large [4].

In the publications, the researchers prove the existence of the so-called "disability paradox". It consists in experiencing higher life satisfaction in people with permanent disability or chronic illness, compared to the healthy population [4,9]. Confirmation of this assumption can be found in a study by Stanisława Byra [9,10]. The author noticed a clearly higher satisfaction with past and present life in the group of men after spinal cord injury compared to an equal group of healthy people. In the group of fit men satisfaction with past and present life was lower, whereas satisfaction with the future exceeded the result of the reseach carried out on the disabled [9].

Among many areas of life, statistically significant differences between the healthy group and people with spinal cord injury have been reported in many studies in the following areas: relationships, sex life, hobbies/vacations. It was observed that lower values in the ill are recorded in the areas of: health and safety, activity and recreation, interesting work [4].

In the own studies, the overall quality of life of people with spinal cord injury is lower than that of healthy people. However, the difference between the groups is small and visible only in the somatic field.

In the studies on people with spinal cord injury, different authors often considered factors related to the injury, such as: level and severity of the injury, age at the time of injury experience and time following the accident. Interestingly enough, numerous studies indicated a minor or total lack of dependence between the quality of life and the aforementioned damage features. Similar results were obtained by comparing tetraplegics and paraplegics, as well as individuals with complete and partial spinal cord injury. Only objective tests of physical functioning showed lower values in people with high-level injury [4]. Own research also confirms these observations.

Age at the time of the injury is not a factor affecting the quality of life either. In the presented works, after spinal cord injury, there was no correlation between the quality of life and the age of experiencing the injury. However, there are studies proving that the younger the person experiencing a spinal cord injury is, the better their quality of life [4].

In studies on the impact of time following the moment of injury on the quality of life, it becomes higher as the time following the accident passes. Patients need a period of adaptation to their different functioning, changing their social position and other consequences of permanent health detriment. Research shows that the improvement of life satisfaction occurs after the crisis period — on average, lasting for 2–5 years from the injury [4]. Stanisława Byra [10] examined people with spinal cord injury in the early and late period following the injury. Satisfaction with the life of people in the first three years after the accident was lower than in the group of respondents ranging from 10 to 15 years after the injury [10].

Contradictions in the literature also concern the influence of the chronological age of the respondents on the quality of life. In some studies, there was no correlation observed between the age of people with spinal cord injury and the quality of life. However, other

researchers proved the deterioration of the quality of life with age, particularly from the fifth decade of life [4].

The examined variable in the group of people after spinal cord injury is their marital status. Those with spinal cord injury living in marital relationships and the single are compared. The results of the research on the Satisfacion with Life Scale and in the social and financial areas examined by the CHART tool were significantly higher in the group of married people. However, there are quite a few authors who argue that the positive effect of a marital relationship may decline over time, particularly in the case of getting married before the injury. The divorce rate for these marriages is higher than for couples who got married after an accident [4].

In our own research, when analyzing the correlation of each of the domains of functioning with the general quality of life, the greatest impact of the psychological and environmental domains was proved.

Numerous scientific papers devoted to people with spinal cord injury deal with the issue of sport. It is important for patients to find a creative way of spending their free time [4]. Sport gives meaning to life and ensures the development of social life.

According to research on Polish athletes taking part in the Paralympic Games, sport has a positive effect on the psyche and social life of people with disabilities. Research by Wodecki et al. [11] among men after spinal cord injury practicing sport proves the great significance of sport as a factor improving health, increasing independence and enabling development in the social sphere.

Conclusions

Summing up the results of the study, it can be said that people with spinal cord injury have a slightly lower overall subjective quality of life than those who are physically fit. Worse quality of life of people after spinal cord injury occurs particularly in the somatic and environmental fields.

Implications for Nursing Practice

Understanding the components of the quality of life of people with disabilities due to spinal cord injury allows the nursing staff and the whole interdisciplinary team to prepare for care and support not only of people who have suffered the injury, but also the caregivers. It also provides information about the necessity of architectural and functional changes in the society and in facilities visited also by people with spinal cord injury.

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